

# FTE Tool

*A Practical Tool for Analyzing Staffing Levels  
and Cost Across Missions*



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# Outline

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- Charting Capabilities
- Mission Fact Sheets
- Tool Construction and Future Vision
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# Introduction

## FTE Tool

Initially developed in 2009 for a NASA customer, the FTE Tool is a plotting capability built on a detailed repository of mission programmatic data. It provides high-level views of the historical staffing\* and cost data for over twenty NASA missions.

## Purpose

- Assists in performing comparative analysis across missions
- Supports analysis of data from development Phases C and D as well as in operations, Phase E
- Helps to track how well a project has kept to the original staffing plan: identifying departures from plan
- Provides a repository of programmatic mission information

*\* FTE is full-time equivalent, which describes a unit of labor.*

# Introduction

## *Missions Supported*

<b>Current Data Sets of the FTE Tool</b>			
Cassini	Dawn	Deep Impact	Genesis
GRAIL	InSight	Juno	Kepler
LADEE	LCROSS	MESSENGER	MAVEN
MER	MRO	MSL	New Horizons
NuSTAR	OCO	OSIRIS-REx	Phoenix
Spitzer	Stardust	STEREO	WISE

# Charting Capabilities

## *Chart Types*

A variety of chart types are available in the FTE Tool\*. The charts enable the user to examine programmatic data in different dimensions and ways.

Currently, there are four chart types:

- *FTE Comparison Plots for Defined Periods*
- *Planned and Actual FTE by Mission*
- *Annual Cost and FTE by Mission*
- *FTE vs. Cost*

Each plot can be generated from mission data for Phases C and D or operations Phase E. The user can select the year for inflation to apply to the data.

*\* The FTE Tool is built on the MS Excel application. The tool is a detailed Excel workbook with embedded Visual Basic macros to automate the generation of plots and allow the user to navigate between them.*

# Charting Capabilities

## User Control Panel

**Full Time Equivalent Comparison Tool version 2014 beta**

Phase C/D Plot Tools												Phase E Plot Tools											
<b>Point of Comparison for Development FTE</b>																							
PDR to Launch																							
<b>Development FTE Mission Comparison</b>												<b>Phase E FTE Mission Comparison</b>											
Juno @ PDR												MESSENGER Actual											
Juno @ CDR												Dawn Actual											
Juno @ SIR												NH Actual											
Juno Actual												None											
None												None											
<b>Development Planned &amp; Actual FTE on Annual Basis</b>												<b>Phase E Planned &amp; Actual FTE on Annual Basis</b>											
Dawn												New Horizons											
<b>Development Dollars &amp; FTE Per Fiscal Year</b>												<b>Phase E Dollars &amp; FTE Per Fiscal Year</b>											
MSL												Dawn											
<b>Year for Inflation = 2013</b>												<b>Fact Sheet</b>											
												Juno											

MAIN | Change Log | FTE Results | FTE Results Phase E | Annual Cost & FTE Chart | Annual Cost & FTE Phase E Chart | FTE - Planned vs Actual | FTE - Planned vs Actual Phase E | Phase CD FTE & Cost | Phase C FTE & Co

Figure 1: Portion of the FTE Tool User Interface, the MAIN tab

# Chart Types

## *FTE Comparison Plots for Defined Periods*

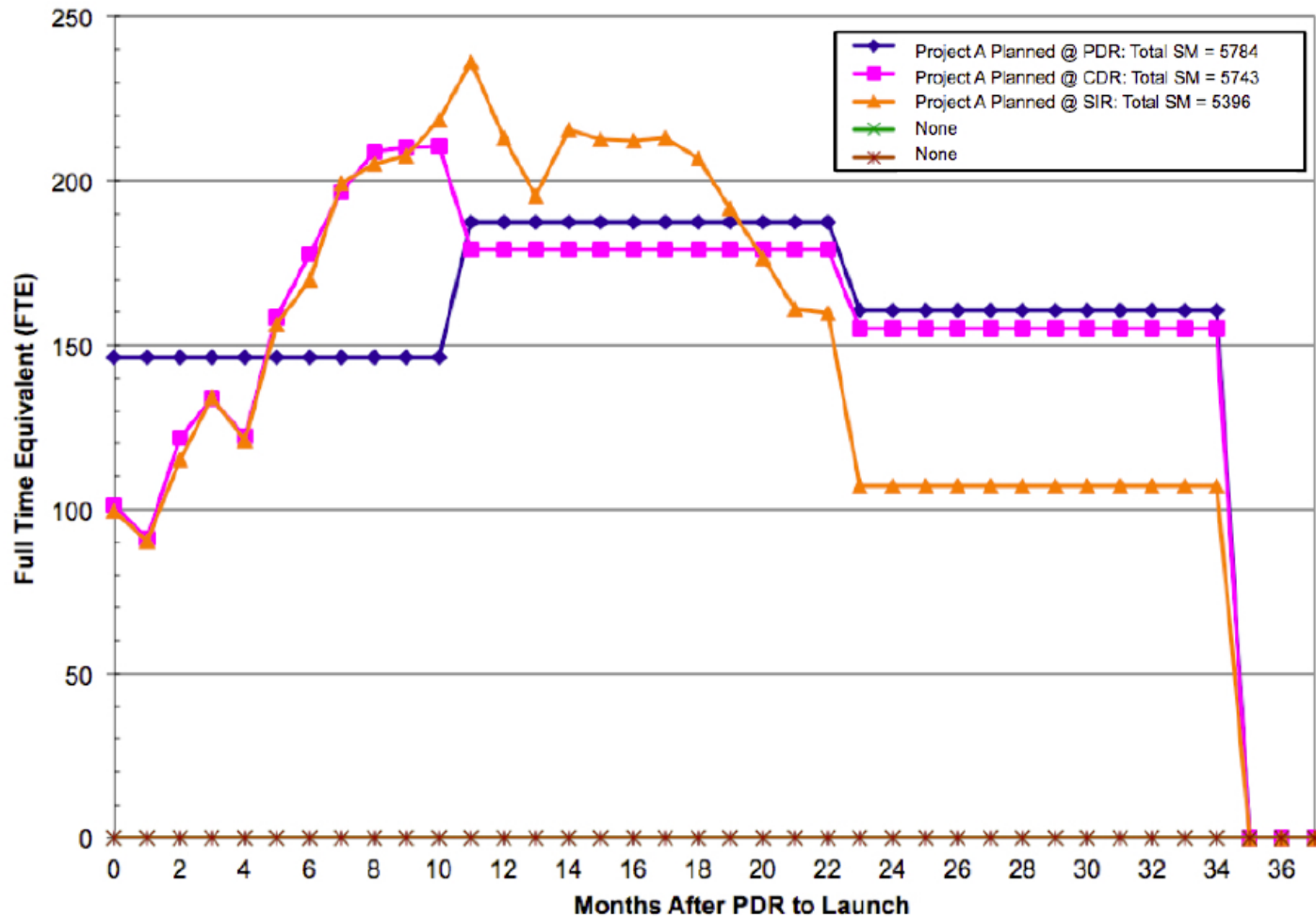


Figure 2: Comparison Plot of FTE for a Selected Project at Various Phase C/D Milestones

# Chart Types

## *Planned and Actual FTE by Mission*

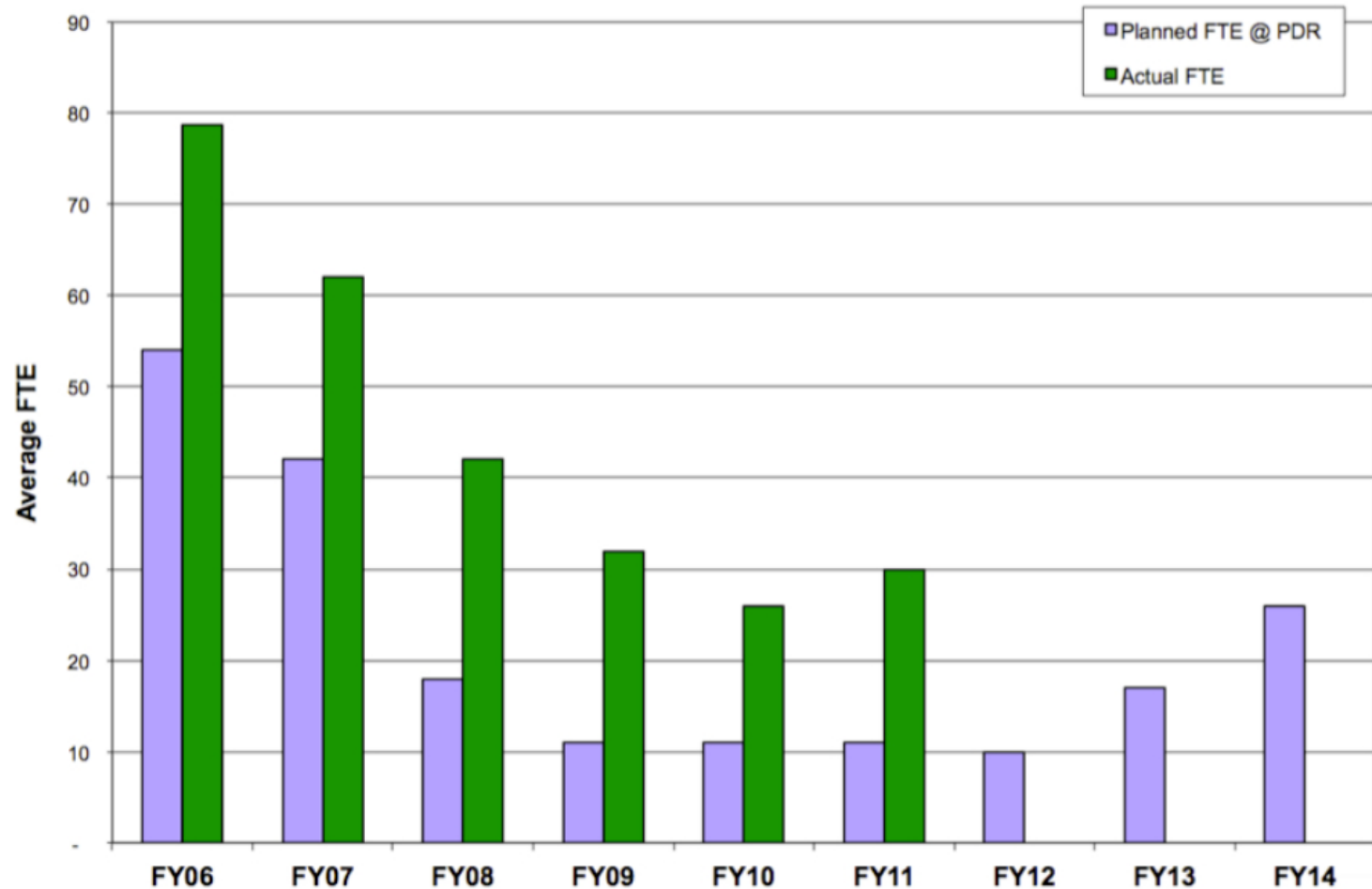


Figure 3: Plot of Planned FTE at PDR and Actual FTE for Phases C/D



# Chart Types

## *Annual Cost and FTE by Mission*

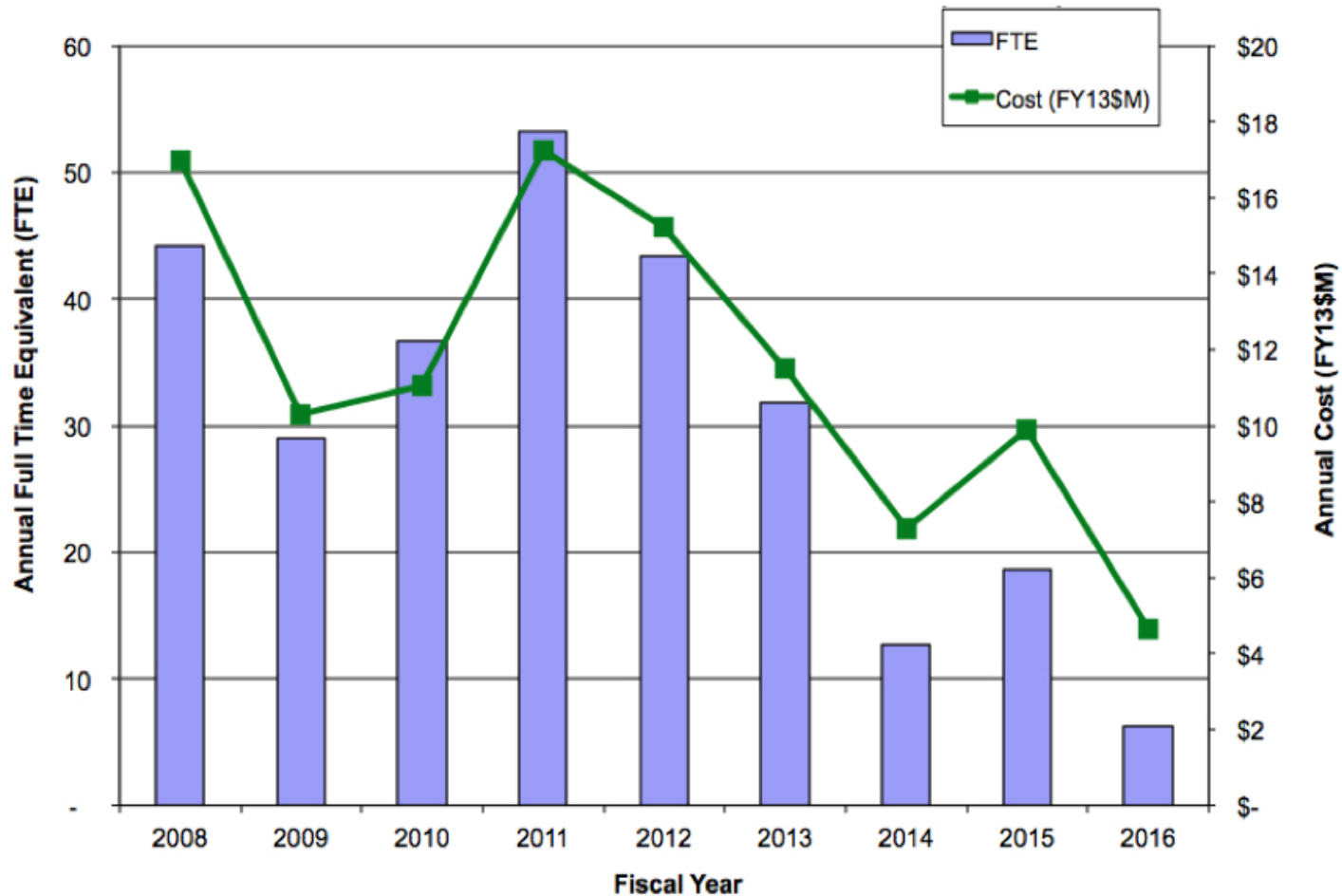


Figure 4: FTE and Cost Per Fiscal Year

# Chart Types

## *FTE versus Cost by Mission Phase*

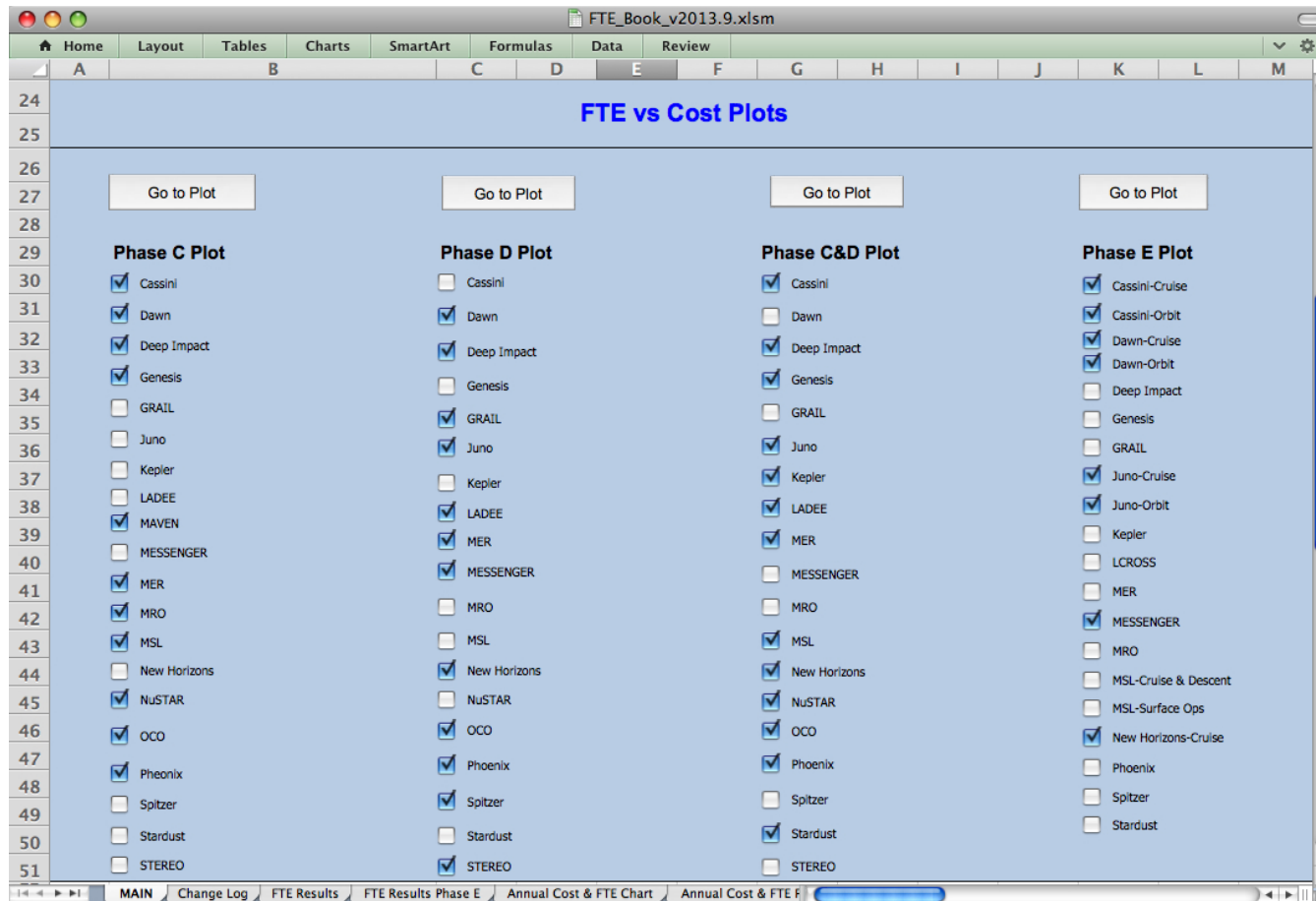


Figure 5: User Interface for the Generation of FTE vs. Cost Plots by Phase, the *MAIN* tab

# Chart Types

## *FTE versus Cost by Mission Phase*

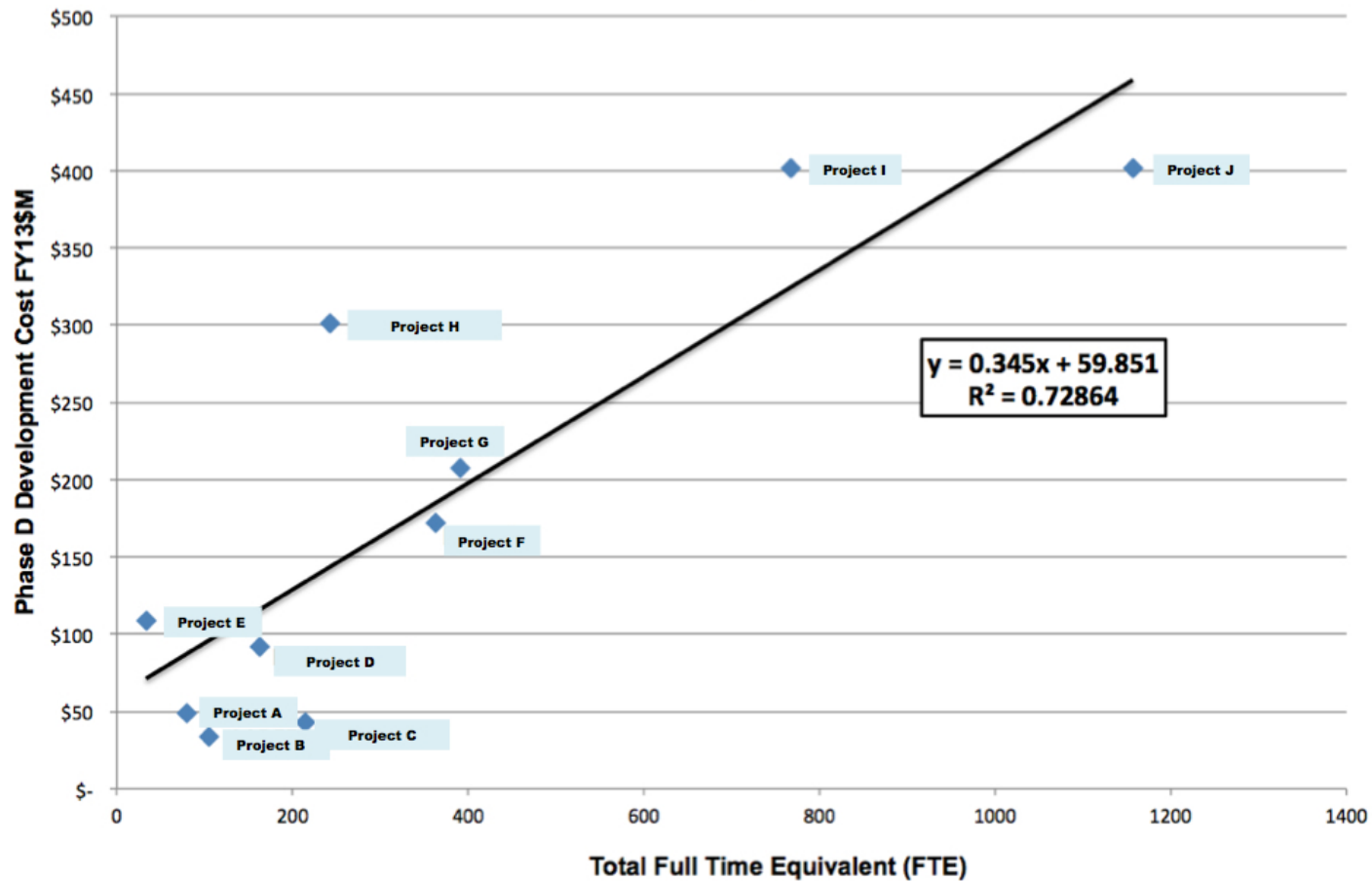


Figure 6: Phase D Development Costs and Total FTE by Project

# Chart Types

## *FTE versus Cost for Phase E*

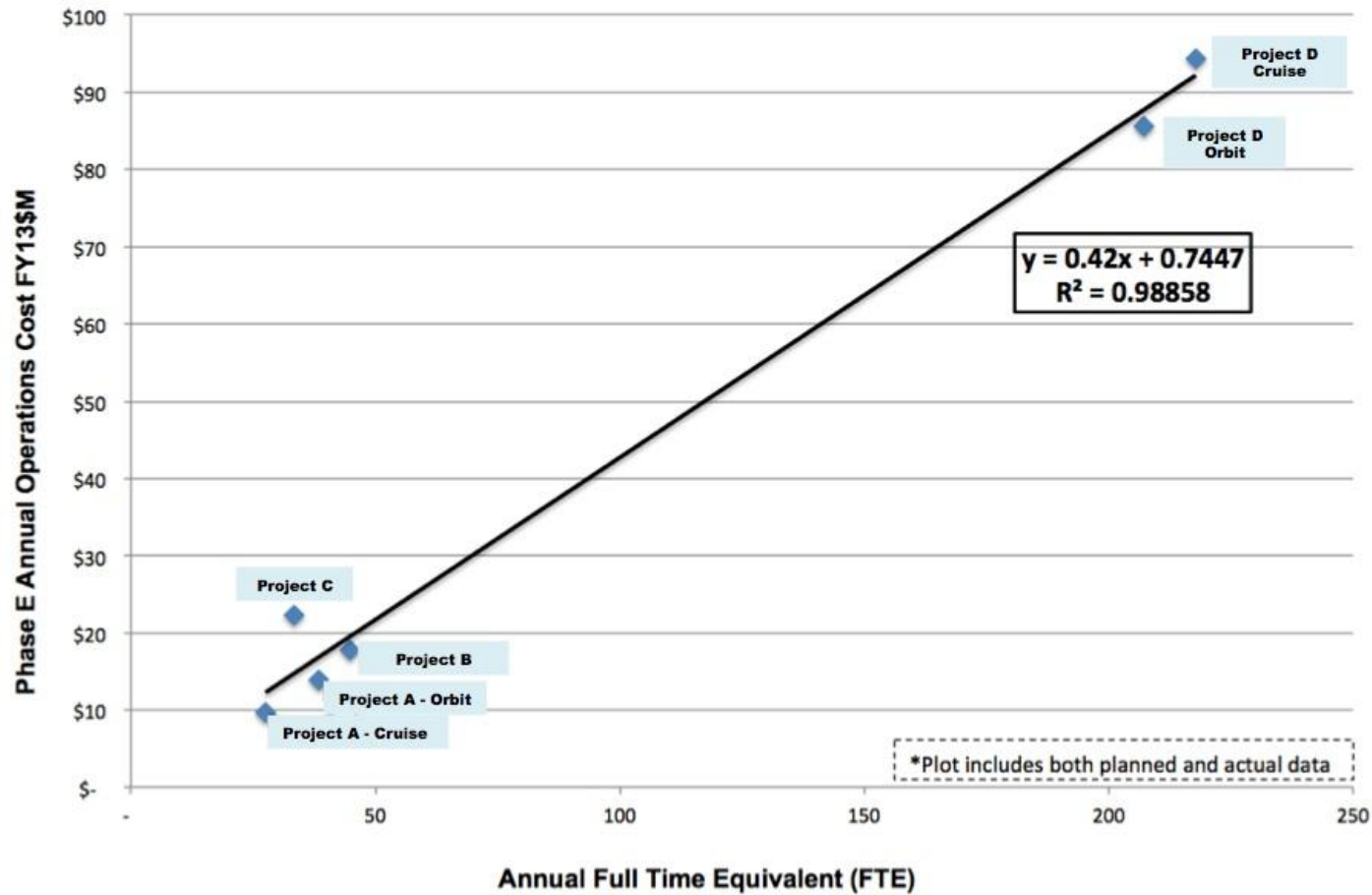


Figure 7: Phase E Annual Operations Cost and Annual FTE by Project

# Mission Fact Sheets

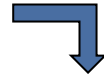
Provide a capsule summary of the mission and project, providing some or all of these items.

- *Overview of the science objectives*
- *Hosted payloads – instruments, sensors*
- *Mission plan and characteristics*
- *Project development milestone dates*
- *Technical performance metrics*
- *Basic concept-of-operation*
- *Diagrams depicting the physical layout of components*

NASA Cost Analysis Data Requirement (CADRe) is the primary source for the information given in these fact sheets. As missions progress, these sheets are updated, and pertinent information is added.

# Mission Fact Sheets

Fact Sheet



## Juno

### Technical Data

Program	New Frontiers
Lead Center	JPL
Bus Manufacturer	LM
Mission Class	B
Launch Vehicle	Atlas V 551
Development Time (months)	72
Design Life (months)	#REF!
Destination	Jupiter
Max Distance from Sun (AU)	5.2
Satellite Wet Mass (kg)	
Propellant Mass (kg)	
Satellite Dry Mass (kg)	
Spacecraft Bus Dry Mass (kg)	
Payload Mass (kg)	
Number of Instruments	8/10
BOL Power (W)	121
Solar Array Mounting Type	Deployable
Solar Array Area (m <sup>2</sup> )	49.4
Pointing Control (deg)	
Pointing Knowledge (deg)	
Stabilization Type	Spin
Star Tracker?	Yes
Mono or Biprop or Ion	Dual-Mode
Transmit Power (W)	25
Downlink Datarate (kbps)	18
Communications Band	X-band

### Schedule Data

ATP Start	Aug-05
PDR	May-08
CDR	Apr-09
Start Assembly (ARR or SIR)	Mar-10
Start Env.Test (ERR or TRR)	Aug-10
Delivery (PSR)	Mar-11
Launch	Aug-11

From: \JUNO\CADRe from PBMA\SIR\JUNO\_SIR\_CADRE\_Part\_A\_032510\_1\_v1\_0.docx, p.35

### Jovian Auroral Distributions Experiment (JADE)

JADE will measure the distribution of electrons and the velocity distribution and composition of ions.

### Gravity Science (GRAV)

The Gravity Science investigation will probe the mass properties of Jupiter by using the telecom subsystem for Doppler tracking.

### Jupiter Energetic-particle Detector Instrument (JEDI)

JEDI is a suite of detectors that will measure the energy and angular distribution of charged particles.

### Ultraviolet Spectrograph (UVS)

UVS is an imaging spectrograph that is sensitive to ultraviolet emissions.

### JunoCam

JunoCam will provide visible-color images of the Jovian cloud tops.

### Jovian Infrared Auroral Mapper (JIRAM)

JIRAM (on aft deck) will acquire infrared images and spectra of Jupiter.

### Fluxgate Magnetometer (FGM)

Two FGM sensors will measure the magnitude and direction of the Jovian magnetic field.

### Advanced Stellar Compass (ASC)

ASC will accurately measure the orientation of the magnetometers.

### Microwave Radiometer (MWR)

MWR is designed to sound deep into the atmosphere and measure thermal emission over a range of altitudes.

### Waves

Waves will measure plasma waves and radio waves in Jupiter's magnetosphere.

Return to MAIN

From: \JUNO\System Integration Review (SIR) 03-01-10\\_D-Project\_Mgmt.pdf, p.7

Figure 8: User Interface Selector and Juno Fact Sheet

Inset diagram courtesy NASA

# Tool Construction and Future Vision

Regarding construction, the tool is a detailed Excel workbook with embedded Visual Basic macros to automate the generation of plots and allow the user to navigate between the *Main* tab and the various charts and mission fact sheets.

- *Tool's data repository is composed of a series of managed Excel worksheets. For each mission, a worksheet tab exists that holds the development (Phase C/D) and operations (Phase E) data sets.*
- *Worksheet tabs exist for each mission fact sheet.*

As the size and functionality of the tool has increased, it has become clear that there are limitations in flexibility, durability, and robustness with the current implementation. One vision of the future implementation of the FTE Tool is

- *Web-based application hosted on secure server with controlled access for the users*
- *Data repository built on an open source relational database*
- *Fact sheets dynamically linked to various project websites*

# Summary

The FTE Tool has been developed and deployed to assist users in their comparative analysis. Built on a detailed repository or database of mission programmatic data, it provides high-level views of the historical data for over twenty NASA missions for development Phases C and D as well as the operations Phase E.

Given the wealth of mission and project information, both programmatic and technical, provided by the FTE Tool, cost analysts and other users can easily leverage the tool's capabilities to answer a variety of questions like the ones listed below.

*An institution has proposed an interplanetary mission with a flight system bus and instrument similar to two previous missions. What can I expect in terms of development costs and staffing during Phases C and D?*

*A particular NASA Center that has flown three previous deep space missions and is submitting an operations budget for Phase E for a new mission. How does this proposed budget compare to the previous estimated and actual Phase E costs for those previous missions managed by that Center?*

*How do staffing levels track to development costs between PDR and ARR for Project Q?*

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